

Ecological and economical significance of homestead forest to the household of the offshore island in Bangladesh

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Abstract: An explanatory survey was conducted to assess the contribution of plant diversity to the ecological and socio-economic condition of the rural household in the offshore island of Bangladesh. Assessment was done by means of multistage random sampling. The homestead sizes of the study area were classified into 3 groups viz, large (>0.25 ha), medium (0.05–0.25 ha) and small (<0.05 ha) based on the result obtained from a preliminary survey, and a total of 45 homesteads, 15 from each group, were selected randomly for the study. The average annual income from homestead's plant diversity varied from Tk 5730.00 (US\$95.5) to Tk 17500.00 (US\$291.67). The rural people were mainly dependent on their homegarden for woodfuel and nutritional requirement as forest was unavailable in the island. The rural people here also cultivated the plant species as a safety measure from frequent cyclone. Constraints hindering the development of homestead plantation were identified and suggestions were given such as the adequate supply of seedlings of fast growing native species and conservation of endangered species to meet the demand of the household as well as to keep ecological balance.

Keywords: Bangladesh; demand; economical significance; homestead forest; offshore island

Introduction

In the view of the present scenario of rapidly growing population leading to over exploitation of natural resources and possible irreversible environmental damage, there is an urgent need for developing an alternative way for sustaining the natural resources. Homestead is the most prospective form of production site along with the seat/shelter of the family. Thus the intimate mixture of diversified agricultural crops and multipurpose trees fulfill most of the basic needs of the local people while the multi-storied configuration and high species diversity of the homestead help to reduce the environmental deterioration commonly associated with monoculture production system.

Farmers of Bangladesh are the owners of homesteads of different size. It usually consists of one house, open and a cultivated area. It is one of the potential sources of plant genetic diversity in Bangladesh. Wide ranges of plant biodiversity for timber and

food crops were found in the homestead forest (Bashar 1999). In the backdrop of the increased rate of deforestation and limitations of the public forestry activities in rural home gardens, the homestead forest gave assumed a special significance in recent times (Khan 1998). Homestead tree production system in villages is a mode of species and genetic conservation for a good number of trees (Alam et al. 1996).

The number of homestead in Bangladesh is 15.4 million which occupies 2.083% of the total land area of the country. To combat present scenario of rapidly growing population leading to over exploitation of natural resources and possible irreversible environment damage, homestead forest is now considered as the most alternative way for sustaining the natural resources (Alam and Mohiuddin 1992).

Sandwip, is a unique example of an offshore island which for a long time get experienced with both erosional and dispositional landforms. As such a wide variety of plant species are usual in the homegarden of Sandwip upazila.

Different aspects on the homegarden in different regions of Bangladesh were studied by some authors. The floristic composition (mainly trees) in the homestead of Bangladesh was studied by many researchers (Alam and Mohiuddin 1992; Alam et al 1996; Das 1990; Hasan and Mazumdar 1990; Khan and Alam 1996; Siddiqi and Khan 1999). Some researchers (Ahmed 1997; Alam et al. 1990, Bashar 1999; Choudhury and Sattar 1993; Islam 1998; Miah et al. 1990; Millat-e-Mustafa et al. 2002; Momin et al. 1990) studied homegarden agroforestry, homegarden plantation and traditional use. But no study was so far conducted solely on the ecological and economic importance of plant diver-

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sity to the homestead of offshore island in Bangladesh. The forests of the country suffer from skewed distribution, and 95% of the forests are concentrated in two border zones in the south-eastern regions, which created spatial variations in biomass availability in the country. With this, availability of nationally supplied gas facility is limited to those villages where there is easiness in communication. Consequently, peoples in the homestead of the offshore island, Sandwip has to depend fully on their homestead plant resources. Again the ecological merits of homestead are related to conservation of soil, water, nutrients and bio-diversity. Hence the present study was undertaken for identifying different ecological merits and also for evaluating the general information related to socio-economic and social benefits derived by the local people from their own homestead.

Material and methods

Sandwip is on the Bay of Bengal occupying an area of 762.42 km². The ecological hazards hitting the area are frequently cyclones and storm surges of various intensities and exceptionally high tides resulting in salt water flooding of agricultural lands. The homesteads are often on raised lands and small. Because of continuous land erosion by the river, population increase and modernization, the size and shape of the homestead are decreasing day by day. Again the potentiality of home gardening is limited to some extent due to salinity.

Field investigations were conducted over a period of three months (July, August and September, 2007). Sandwip lies between latitude 22°22' N and 22°43' N and longitude 91°18'E and 91°34'E and is situated in the Bay of Bengal at Lower Meghna Estuary. According to statistical pocket book, Bangladesh 2005, total households of the upazila was 43292 (BBS 2005). Among 20 upazillas (Sub-district) of Chittagong district, Sandwip upazila was selected purposively as it was the only offshore island of the district, suitably representing the identical feature of island areas of Bangladesh. Three unions were selected randomly for the study out of 19 unions in Sandwip upazilla. From every union, one village forming a total of three villages viz, Harishpur, Musapur and Maitvanga were selected. Homestead size (the area, a household occupy) was used as the basic for stratification as it was a critical variation in the economic study related to plant diversity. The homestead sizes of the study area were classified into 3 groups viz, large (>0.25 ha), medium (0.05–0.25 ha) and small (<0.05 ha) based on the result obtained from a preliminary survey using pre-tested questionnaire on the socio-economic status of the households. The households from each selected union were randomly selected from a list of household according to farm size provided by Upazilla Porishad. A total of 45 households, 15 from each group (i.e. 5 of each group from each of the three villages of the Sandwip upazilla), were taken to represent the real situation with help of semi-structured questionnaires (that was surveyed door to door). Data on homestead plant resources, their diversity, and the role of these resources on the ecological and economic status of the households were collected. Simple mathematical analysis was done for the interpretation of the data. Data were compiled and tabulated in functional

ways.

Results and discussions

Demographic features of the study area

Rural inhabitants in Bangladesh are either involved in the agricultural or sell their labor for cash. A small portion of the inhabitants invests their cash in business while some earn their livelihood from service either in the location or elsewhere. The study revealed that out of the five occupations of the respondents, the agricultural was the major occupation (40%) in the study area followed by foreign job 23% and business 15.5%. Only the respondents from the small farm category were found to take fishing as their occupation (Table 1). The mean annual income of the respondents was Tk. 84 500 (with a minimum of Tk. 42 000 and a maximum of Tk. 210 000).

Table 1. Distribution of the respondents according to their occupation in the study area

Category	% Respondent			Total
	Small	Medium	Large	
Agriculture	8	7	3	18 (40)*
Fisheries	3	0	0	3 (7)
Inland services	2	3	2	7 (5.5)
Foreign job	1	2	4	7 (5.5)
Business	1	3	6	10 (15)
Average	15	15	15	45 (100)

* Figure in parentheses indicate the percentage of respondents in different categories

The range of education level of the respondents and family members ranged from no formal education to above college level (Table 2). It was revealed that 35.8% (highest proportion) of the family members had no formal school education and only 28.0% and 19.5% of the family members were able to obtain primary and college to university level education. Higher literacy rate (64.2%) in the study area than the Bangladesh Bureau Statistics (1999) report (46%) indicated the upgraded socio-economic condition and awareness of the people in the study area.

Table 2. Distribution of family members according to education level

Category	Family members	
	Number	Percent (%)
Illiterate (No schooling)	101	35.8
Primary level (I–V)	79	28.0
Secondary level (VI–X)	47	16.7
Above secondary (College and University)	55	19.5
Total	282	100.0

Plant diversity and species richness

In the surveyed homestead a total of 34 species (24%) of fruits, 24 species (17%) of timbers, 21 species (15%) of fuelwoods, 15 species (11%) of medicinals, 11 ornamental species (8%) and 37

species (25%) of vegetables and spices were identified (Fig. 1).

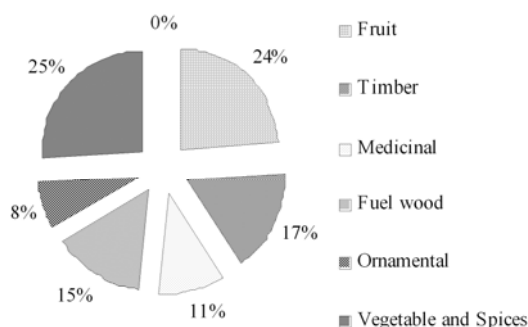


Fig. 1 Different types of plant species with their percentage of occurrence

The fruit trees dominated over the other species in the homegardens. Similar observations were made by several authors (Millat-e-Mustafa 1997, Siddiqi and Khan 1999) in different regions in Bangladesh. The reasons for growing a variety of fruit species in the homegarden and farmers' preferences in growing certain trees are more and less complex. Geographical location, age of the holdings, nature of the principal wage earner and of the family members, availability of planting materials, availability of space, commercial value etc. may be the guiding factors affecting farmers' species preferences in the study area. These findings are also supported by the study of Millat-e-Mustafa (1997) for the homegardens of four regions in Bangladesh. Evaluation on farmers' species preferences showed that farmers preferred to plant fruit tree species (75.0%) for future plantation followed by timber species (63.3%), fuel wood (45.0%), medicine (11.7%), and others (5%) (Fig. 2).

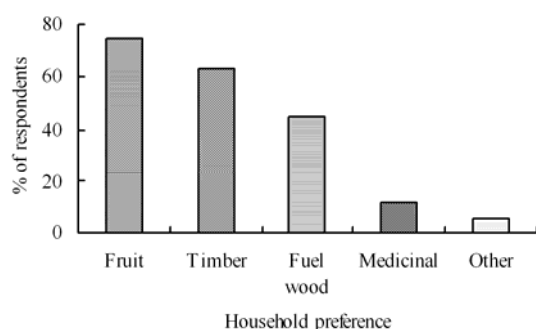


Fig. 2 Choice of species for future plantation in the study area

Floristic elements of the homestead flora consist of both native and exotic species. About 20 species of tree species were identified as exotics and some of them have been domesticated. This is for the abundance of healthy seedlings of those species and also for obtaining more economic value within a short period. *Albizia richardiana*, *Leucaena leucocephala*, *Swietenia mahagoni*, *Psidium guajava*, *Cassia siamea*, *Terminalia catappa* *Delonix regia*, *Tamarindus indica* etc. have been domesticated and have a

long heritage of introduction. Recently fruit bearing species were gradually being replaced by some exotic timber species such as *Swietenia mahagoni*, *Acacia auriculiformis*, *Tectona grandis* and *Eucalyptus* spp etc. because of the people's attitude towards earning more money through timber production.

Rural households in the study area plant the species in different locations of the homegarden without any scientific considerations. Some authors also reported similar observations from Bangladesh (Millat-e-Mustafa 1997), the Pacific (Fernandes and Nair 1990) and from the Kandy homegardens of Sri Lanka (Wickramasinghe 1995). Preferences in selecting species for different parts of their homegardens vary with farmer's taste and attitude.

Significance of homestead plant resources

Farmers benefited from homegarden in several ways. Homegarden plant diversity acts as a "reserve bank" of food and cash for farmers. The income from plant diversity was significantly different in the farm categories. It was observed that the medium farmers intensively cultivated the homegarden (Table 3). This might be the reason for obtaining more income from their homegarden. The average annual income from homestead's plant species was Tk. 11 410 (US\$190.17), accounting to 13.5% of their total annual income, and it varied from Tk. 5 730 (US\$ 95.5) to Tk 17 500 (US\$291.67). Due to the varied biological cycles of the homegarden components, small daily harvests could be made year round immediate home consumption. Actually the contribution or the significance of the homegarden plant resource can not be quantified in detail as beside the monetary output the vegetation provide different services such as shade, living fences, windbreaks, checking land erosion and providing firmness.

Table 3. Distribution of income according to farm category (Tk*/Year)

Farm category	Small	Medium	Large	Average
Income from household (Tk/Year)	5 730	11 000	17 500	11 410

*Tk 60.00=US\$1.0

In the study area border planting was very common. Border planting of trees and shrubs species was usually done for serving as windbreak against the frequent cyclones, and ridge bounds of ponds for checking soil erosion. Mandar (*Erythrina indica*), Bhadi (*Lannea coromandalica*) were found around ponds, farm-lands and marshy places in the study area for serving as living fences and fuel wood since it did not require any pre-treatment for fire. Abundance of trees found usually around the house, acted as windbreak during cyclonic storm. Groups of trees were around toilet for using as natural screen and around kitchen and in several spots of ponds ridges to make a barrier of vision.

Conclusion

Our historical, cultural and ethical resources were in danger because of increasing unimagined human need (Agarwal 1990).

Since the production unit of homestead was small and people lived there, it has been better prevented from the problems that are acute in the forestry sector. Moreover, homegarden were important source of supplementary food, fodder, fuelwood, first aid and timber resources for the households in the study area. It was reported that people exterminated many tree species from the forest and many were threatened by some man-made causes. At the same time it was observed that social attitude towards the homestead forestry was more or less positive. Finally it is recommended that as the ethical, aesthetic, cultural and economic values of plant diversity are increasingly recognized, it is necessary to take special attitude towards the conservation and proper management of homegarden plant diversity.

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